REMARKS

In view of both the amendments presented above and the following discussion, the applicant submits that none of the claims now pending in the application is obvious under the provisions of 35 U.S.C. § 103. Furthermore, the applicant also submits that all of these claims now satisfy the requirements of 35 U.S.C. § 112. Thus, the applicant believes that all of these claims are now in allowable form.

Specification Amendments

Applicant has amended the specification in response to the objections raised by the Examiner. Specifically, applicant has amended page 6, line 24 of the specification to correct the reference numerals for the subtractor and loop filter as listed on Figure 2. Applicant has also amended page 7, line 19 of the specification such that the pre-equalizer attenuates the higher bandedge frequency if the amplitude at the upper bandedge frequency is larger than the amplitude at the lower bandedge frequency.

Objections

The Examiner objected to page 6, line 24 of the specification as having mislabed reference numerals for the subtractor and the loop filter. The Examiner also objected to page 7, lines 18-23 of the specification as confusing.

Applicant has amended the specification in response to these objections. In view of these changes, the applicant respectfully requests that the objection be withdrawn.

Rejections

A.   35 U.S.C. § 112

The Examiner rejected claims 6-8 under the provisions of the first paragraph of 35 U.S.C. § 112 as containing subject matter which was not described in the specification in such a way as to enable one skilled in the relevant art to make or use the invention. Specifically, the Examiner rejected the matrix format of the filter in claims 6-8. Applicant will clarify these formats as requested by the Examiner.

Digital filters, as well known in the art, are typically characterized with coefficients and finite filter lengths. As such, digital filters are typically characterized as a matrix of coefficients. Specifically, a Hilbert filter has an antisymemetric unit sample response, which means $h(n) = -h(M-1-n)$, where M is the filter length and $n = 1,2...M$. For example, if $M = 3$, then $h(1) = -h(3)$. Also, the Hilbert filter unit sample response is ideally zero if n is even. In addition, a Hilbert transformer imparts a 90% phase shift to a complex input signal. As the complex input signal comprises in-phase and quadrature components, the filter response also includes two separate components that correspond to the transform applied by the filter to each component of the complex input signal. Therefore, the matrix includes two rows, one row showing the response to the in-phase component and the other row showing the response to the quadrature component. See the attached Hilbert transform discussion from John G. Proakis & Dimitris G. Manolakis, Digital Signal Processing Principles, Algorithms and Applications 610-15 (2d ed. 1992).

Therefore, one skilled in the art would recognize the filters in claims 6-8 as representations of a simple finite length Hilbert filter.

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The Examiner also rejected claim 6 under the provisions of the second paragraph of 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner noted that claim 6 lacked antecedent basis. Applicant has amended claim 6 to properly depend upon claim 4.

Having made these changes, the applicant submits that claims 6-8, as they now stand, are definite and hence fully satisfy the requirements of 35 U.S.C. § 112. As such, the applicant respectfully requests the Examiner to withdraw the rejection to claims 6-8.

B.   35 U.S.C. § 103

The Examiner has rejected claims 1, 9-10, 12 and 15-16 as being unpatentable over the Ungerboeck patent (United States patent 4,969,163 issued November 6, 1990) in view of the Herzberg patent (United States patent 5,881,108 issued March 9, 1999). The rejection is respectfully traversed.

Ungerboeck teaches timing control circuit for modem receivers. Specifically, Ungerboeck evaluates the bandedge components of a received signal to generate a timing (clock) signal independent of the signal energy at the bandedges or the frequency separation between the bandedges.

Herzberg teaches a pre-equalizer to adapt the coefficient values at the transmitter in response to changes in the communications channel. Specifically, Herzberg generates an adaptation signal at the receiver to adapt filter coefficient values for the pre-equalizer at the transmitter.

In view of the individual teaching of the prior art, a combination of Ungerboeck and Herzberg would result in a timing control and equalizer circuit that evaluates the bandedge components at the receiver and, as a result of that evaulation, generates a clock signal for timing control and generates an adaptation signal back to the transmitter in response to changes in the communication channel.

However, the resulting combination fails to disclose an apparatus or method for <u>adjusting the amplitudes of the bandedges</u> of the input broadband signal in response to a control signal as claimed in applicant's invention.

In contrast to this combination, applicant's claims 1 specifically recites:

1.   Apparatus for equalizing the bandedges of a broadband signal comprising:
     <u>a pre-equalizer for adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal</u>;
     a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal; and
     a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal. (emphasis added)

The Examiner has noted that applicant's process of amplitude equalization is nearly identical to the timing control discussed in Ungerboeck. Applicant respectfully disagrees.

Ungerboeck generates a clock signal to perform sequencing or timing control (Figure 5). There is no indication that this clock signal is coupled back into the apparatus to adjust the

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input signal. In fact, Ungerboeck generates a timing or clock signal <u>independent</u> of the signal energy at the bandedges (column 1, line 66 to column 2, line 2). In contrast, applicant's invention actually adjusts the bandedge amplitudes, which directly affects the signal energy. Hence, the timing control in Ungerboeck is different than the amplitude adjustment or equalization as claimed by applicant.

Moreover, Herzberg adjusts the filter coefficients <u>at the transmitter</u> in response to changes in the communications channel. This process also differs from actually adjusting the amplitudes of the bandedges of the input broadband signal as claimed by applicant.

Therefore, neither Ungerboeck or Herzberg, alone or in combination, disclose an apparatus for <u>adjusting the amplitudes of the bandedges</u> of the input broadband signal in response to a control signal.

As claims 12 recites similar limitations to those of claim 1, the foregoing response also applies to claim 12.

Therefore, the applicant submits that claims 1 and 12, as they now stand, fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.

Furthermore, dependent claims 9-10 and 15-16 depend, either directly or indirectly, from respective claims 1 and 12 and recite additional features therefor. As such and for the exact same reasons set forth above, the applicant submits that none of these claims is obvious with respect to the teachings of Ungerboeck in view of Herzberg. Therefore, the applicant submits that all these dependent claims also fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.
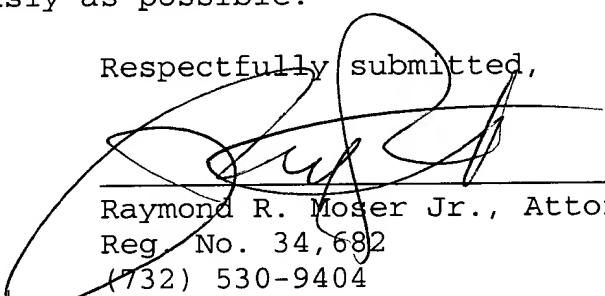
Conclusion

Thus, the applicant submits that none of the claims, presently in the application, is obvious under the provisions of 35 U.S.C. § 103. Furthermore, the applicant also submits that all of these claims now fully satisfy the requirements of 35 U.S.C. § 112. Consequently, the applicant believes that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Raymond R. Moser Jr., Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

7-30-99
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Date

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Raymond R. Moser Jr., Attorney
Reg. No. 34,682
(732) 530-9404

Thomason, Moser & Patterson
Attorneys at Law
The Galleria
2-40 Bridge Avenue
P.O. Box 8160
Red Bank, New Jersey   07701

Please continue sending all correspondence to:
    Law and Patent Operations
    Sarnoff Corporation
    CN 5300
    Princeton, NJ   08543-5300

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